REMARKS

Status of Claims

Claims 1-17 are pending in the application.

Claims 1 and 11 are amended to clarify that the spacer exhibits a ball shape, i.e., the topographic change exhibits a generally spherical peak with a radius that is greater than the height of the topographic change. As explained in paragraph [0010] of the specification, this is the most significant distinguishing feature of the present invention, i.e., "This leads thereto, that the resulting topographic change becomes more ***"spherical" shaped at it's apex***, so that it exhibits an apex radius that is greater than the height of the topographic change. This type of topographic change is more suitable as a spacer than those previously known, since, due to its ***spheroid shape***, it is less likely to press into the opposite sheet metal or itself become deformed, and thus less undesired deviations in sheet spacing would occur. Besides this, even in the case that the sheet metal is thin, no imprints are created by the topographic changes on the opposite side of the sheet metal being spaced. Further, coated sheets with the topographic changes produced in the inventive manner exhibit an improved corrosion resistance compared to those produced by previously known methods. On the one hand, a spherical peak is less likely to penetrate into the sheet metal to be spaced apart and thus causes little or no damage to the coating. On the other hand, the depression of the sheet metal, from which material of the projecting topographic changes are formed, is fundamentally flatter in shape than those produced by known methods, and thus has less of a tendency to harbor moisture (less capillary effect)."

As explained in the specification, no prior art teaches how to form such an advantageously shaped spacer, particularly in high strength steels.

Turning to the Office Action the paragraphing of the Examiner is adopted.

Claim Rejections - 35 USC § 103

Claims 1-3, 6-13, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coleman et at (US 6,483,069) in view of Mombo-Caristan (US 5,595,670) or Sciaky et al (US 4,626,653).

According to the Examiner, Coleman shows the process claimed including a laser beam directed to the metal sheets wherein the laser beam produces a topographic change in the form of a weld bead between the metal sheets wherein the weld bead has a radius greater than the height of the bead extending from the sheet at the foot of the topographic change wherein the ratio peak radius and the height is at least 2:1 (also see Figure 6C). But, Coleman does not show that the laser beam is carried out in a movement with transverse and longitudinal components for the coated sheets.

Mombo-Caristan shows a laser beam for welding zinc coated steel wherein the laser beam describes a circular or elliptical movement with the combination of mirrors and lenses as the transverse and longitudinal components.

Sciaky also shows that it is known in the art to provide a combination of the mirrors to allow a laser beam to describe a movement in a circular form that includes the transverse and longitudinal movement. Sciaky also shows its laser beam that is discontinuously applied with regard to its power.

In view of Mombo-Caristan or Sciaky, it would have been obvious to one of ordinary skill in the art to adapt Coleman with the beam laser that is carried in the transverse and longitudinal movement for the increased welding process having an increased welding speed without defects.

Applicants resepctfully traverse.

Regarding Coleman, this reference teaches that when joining two structural members by high-energy welding the welding process consumes some of the material of the members being joined. Coleman compensates by providing in advance (by casting, machining and/or forging – col. 6, line 17) a ***consumable weld land*** preferably so dimensioned that the extra material is consumed during welding. If extra material does remain, it is removed by a post welding mechanical machining step or laser glazing (see Figs. 4A-4C and associated text).

Coleman thus

- casts, machines and/or forges a raised weld land before welding, whereas the present invention forms a topographic change on a flat coated sheet;
- welds together two uncoated sheets, thus is not concerned with the problem of explosive vaporization of gas when welding together two coated sheets, whereas the present invention teaches how to produce minimally intrusive yet highly functional spacers adapted for separating coated sheets during a subsequent welding step;
- welds together two sheets along a seam, thus forms an elongate weld, not a spot weld, and in particular not a topographic change which exhibits a generally spherical peak with a radius that is greater than the height of the topographic change; and
- machines or laser glazes away any excess remaining material to provide a smooth surface as shown in Fig. 4C (col. 50, line 48).

The present invention in contrast produces a topographic change which exhibits a generally spherical peak with a radius that is greater than the height of the topographic change. This shape is adapted to separate two coated blanks so far that they are separated wide enough to allow venting of the vaporized coating but close enough to allow welding without falling in of the weld seam. The allowance for venting of vaporized gas can only be achieved if the spacers are dot-shaped, not if the protruding surface were an elongate weld as taught in Coleman – the ***elongate weld would form a barrier*** to prevent escape of gas, thus containing gas and increasing damage!

Further, Coleman nowhere teaches spacing the two structural members to be welded. Rather, two members are placed flush against each other and welded. Once the structural members of Coleman are joined together by the electron beam, Coleman teaches that the weld land 20 is removed from the structural assembly 22 using known mechanical machining processes, such as using cutting or grinding tools, to thereby provide a structural assembly having a smooth finished surface. This results in removal of spacer.

The shape of the protrusion of Coleman is based on the need to provide material to to fill otherwise occuring key holes, undercuts and underfills resulting from material consumption

during high energy electron (or laser or plasma) beam welding. The present invention does not consume material, at least not to the extent of Coleman. The present invention melts, stirs, and shapes the melt to form a nice rounded spherical peak projecting above the surface of the flat sheet starting material to form a spacer. Coleman has no such teaching.

As can be see, Coleman does not teach the structure of the present invention, nor the objective of the present invention. The present invention is concerned with providing a protrusion which is adapted to space coated sheets prior to welding; Coleman needs a protrusion which should be consumed and must contain enough material.

Accordingly, a person skilled in the art would not look into Coleman for any hint how to produce an appropriate shaped and dimensioned spacer to avoid eruptions of vaporized coating during welding.

Mombo-Caristan discloses a welding method using a high energy beam which is shaped oblong for decreasing average power density to minimize welding defects. The beam spot is (according to claim 24) oscillated about an axis. The beam spot is oblong and angled within the range of 45° (according to claim 1). In the corresponding description to the figs 12D +E nothing is disclosed about any protrusion resulting from this welding method. Instead it is told that due to this method welding defects can be minimized and prevented and weld width enlarged. This method as disclosed is not suited to produce a protrusion.

In particular, there is no disclosure of how to form as a spacer a topographic change which exhibits a generally spherical peak with a radius that is greater than the height of the topographic change. Since both references teach forming a linear weld, there is no relevancy to the present claims, as amended, to clarify that the spacer is a spot rather than a linear topographic change.

In none of the documents found by the examiner there is any hint how to raise a protrusion with a laser beam, especially there is no hint how to create a protrusion with a 'ball' tip.

Next, claims 4, 5, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coleman in view of Mombo-Caristan or Sciaky as applied to claims 1-3, 6-13, 16 and 17 above, and further in view of Stol et al (US 6,740,845) or Robertson et al (US 5,038,016).

Coleman in view of Mombo-Caristan or Sciaky shows the process claimed except for the laser beam that is not focused on the surface.

Stol or Robertson shows that it is well known to provide a defocused laser beam for welding, and Stol further shows the laser beam that describes a movement in a circular or elliptical pattern, or any other desired pattern.

In view of Stol or Robertson, it would have been obvious to one of ordinary skill in the art to adapt Coleman, as modified by Mombo-Caristan or Sciaky, with the laser beam that is defocused since such defocused laser beam is well known to effectively weld the gaps between the metal sheets while prevent melting of the sheet substrate, and it would have been obvious to further adapt with laser beam in any figures including the recited figures to also effectively weld the abutting or adjoining coated metal sheets.

In response, Applicants again point to the amended claims and the disclosure stating that the novelty of the present invention is in the the resulting local or spot topographic change becomes more ***"spherical" shaped at it's apex***, so that it exhibits an apex radius that is greater than the height of the topographic change. This type of topographic change is more suitable as a spacer than those previously known, since, due to its ***spheroid shape***, it is less likely to press into the opposite sheet metal or itself become deformed, and thus less undesired deviations in sheet spacing would occur. Besides this, even in the case that the sheet metal is thin, no imprints are created by the topographic changes on the opposite side of the sheet metal being spaced. Further, coated sheets with the topographic changes produced in the inventive manner exhibit an improved corrosion resistance

In none of the documents found by the examiner there is any hint how to raise a protrusion with a laser beam, especially there is no hint how to create a protrusion with a 'ball' tip.

Should further issues remain prior to allowance, the Examiner is respectfully requested to contact the undersigned at the indicated telephone number.

The Commissioner is hereby authorized to charge any fees which may be required at any time during the prosecution of this application without specific authorization, or credit any overpayment, to Deposit Account Number 16-0877.

Respectfully submitted,

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